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ORIGINAL ARTICLE

Improved lymph node retrieval in Whipple specimens as a result of implementation of a new uncinate margin protocol

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Abstract

Background. Lymph node status is an important prognostic factor in pancreatic and peri-ampullary adenocarcinoma. We recently changed our protocol for assessment of the uncinate margin of Whipple specimens and noted that lymph nodes were often present in uncinate margin sections. *Materials and methods.* Whipple specimens from 2004 to 2006 were divided into two groups, those that were handled according to the *en face* protocol, and those handled according to the radial protocol. The numbers of lymph nodes found in uncinate margin sections were assessed, as well as the total number of nodes found in the specimen. *Results.* Sixteen cases were handled according to the *en face* protocol, and 20 according to the radial protocol. In the *en face* group, 2 benign nodes were found in the uncinate margin (0.1 nodes per case), while in the radial group, 36 nodes (1.8 nodes per case) were identified ($p = 0.0005$). Eight cases in the latter group had positive nodes in the uncinate margin sections. In two of these cases the positive lymph node was the only lymph node with metastasis, and in an additional case the involved node was one of two positive lymph nodes. Total lymph node retrieval was 15.5 lymph nodes per case in the *en face* group, and 20 nodes per case in the radial group ($p = 0.02$). *Discussion.* The improved lymph node retrieval may be due to additional nodes found in radial sections of the uncinate margin, or alternatively, due to increased vigilance in specimen handling. In 3 of 20 cases, nodes found in the radial sections influenced staging.

Key Words: *Whipple specimens, lymph node retrieval, uncinate margin*

Introduction

The pancreaticoduodenectomy (Whipple) specimen is one of the most challenging specimens to evaluate in surgical pathology. Special attention is required with regard to margins and lymph node status, as these are two of the most important prognostic factors in pancreatic, ampullary, and periampullary adenocarcinoma [1–5].

In our institution, we recently introduced a new protocol for the intraoperative assessment of the pancreatic uncinate margin [6]. Before the introduction of this procedure, the uncinate margin was usually assessed using an *en face* method. Because of the perceived deficiencies of this method, the new protocol stipulates that the uncinate margin should be painted, its distal 1 cm is serially sectioned radially, and entirely submitted (Figure 1). This technique is also utilized in the submission of the uncinate margin for permanent assessment in cases where the uncinate margin has not been evaluated intraoperatively. We believe that the new protocol allows for more accurate determination of uncinate margin status, as the entire margin is submitted without the excess shaving of adipose tissue from the margin with the *en face* approach.

With the new protocol, we started to anecdotally notice that lymph nodes are commonly encountered in our sections from the uncinate margin. Given the importance of lymph node status as a prognostic factor, we endeavored to objectively document this observation, trying to determine if our change in

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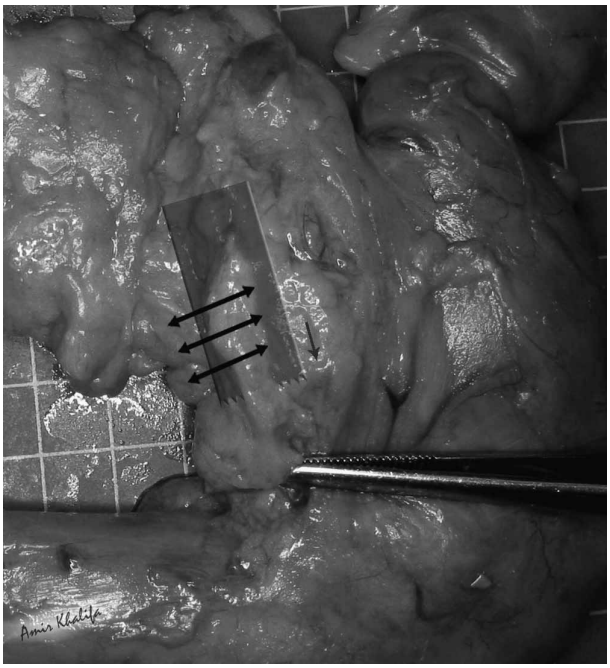

Figure 1. Technique for uncinate margin assessment. The uncinate margin is amputated (shaded area). If an *en face* technique is used, the marginal tissue is shaved and placed in a single block. Using the new radial protocol, the margin is painted, the tissue is serially sectioned (double-headed arrows) from superior to inferior (single-headed arrow) and placed in separate blocks.

protocol had significantly changed our lymph node retrieval rate in pancreaticoduodenectomy specimens.

Materials and methods

Reports and slides from pancreaticoduodenectomy specimens at our institution were reviewed from 2004 to 2006. All surgeries were performed by two hepatopancreatobiliary surgeons for the primary clinical and imaging diagnosis of malignancy. The resected specimens were all consistently handled by two senior pathologist assistants for intraoperative consultation as well as grossing for permanent sectioning. Since the surgical pathology service in our department follows a subspecialization model, all hepatopancreatobiliary resection specimens were reported by five pathologists who have certain expertise and interest in this field.

The cases were divided according to the method of submission of the uncinate margin (*en face* versus new radial protocol). Only traditional Whipple resection specimens for solid lesions in the head of the pancreas or periampullary region were included in the study; more extensive resections were excluded given the likelihood that they would spuriously increase the lymph node count. The groups were compared with respect to lymph node count in sections from the uncinate margin, number of positive lymph nodes in the uncinate margin, and overall specimen lymph node count. Statistical analysis for differences between the groups was performed using the Student's *t* test.

Results

During the study period 16 cases were handled according to the *en face* protocol, and 20 were handled according to the new radial protocol. The demographic data of the patients undergoing resection and the distribution of cases by surgeon are summarized in Table I. All cases were handled intraoperatively and postoperatively with an assumption of malignancy; the final diagnoses and number of cases where the uncinate margin was assessed intraoperatively are listed in Table II.

In the *en face* group, two nodes were found in the uncinate margin sections (0.1 nodes per case), while 36 nodes were found in the radial group (1.8 nodes per case). No positive lymph nodes were found in the *en face* sections of cases with malignant diagnoses, but eight cases in the radially sectioned group had positive nodes in the uncinate margin sections. In two of these cases the positive lymph node was the only lymph node with metastasis, and in an additional case the involved node was one of only two positive lymph nodes found.

The average number of lymph nodes retrieved per specimen was 15.5 in the *en face* uncinate margin group and 20 in the new radial protocol group ($p = 0.02$). If only pancreatic cancer cases were considered, the average number of lymph nodes retrieved per specimen was 16.3 in the *en face* group vs 20.5 in the radial group (NS).

Discussion

Lymph node and margin status are two of the most significant prognosticators in pancreatic adenocarcinoma. In this study, we have demonstrated how our efforts to improve accuracy with respect to margin status had the unanticipated effect of increasing our lymph node yield.

The uncinate process of the pancreas extends posterior to the portal vein and approaches the right lateral aspect of the superior mesenteric artery. The area separating pancreatic tissue from the superior mesenteric artery consists of adipose tissue that may be lymph node-bearing, corresponding to the superior

Table I. Demographic information and case distribution by surgeon.

Parameter	*En face* protocol	New radial protocol
Number of cases	16	20
Patient age		
Range	43–77 years	46–84 years
Mean	64 years	63 years
Median	68 years	63 years
Patient gender (F:M)	7:9	7:13
Surgeon		
Surgeon #1	8	12
Surgeon #2	8	8

Table II. Diagnoses and performance of intraoperative consultation (IOC) on uncinate margin.

	En face protocol		New radial protocol	
Tumor	Number of cases	Cases with IOC	Number of cases	Cases with IOC
Pancreatic adenocarcinoma	11	6	13	7
Ampullary adenocarcinoma	1	0	3	1
Duodenal adenocarcinoma	0	0	2	1
Bile duct adenocarcinoma	1	1	2	1
Endocrine tumour	1	0	0	0
Intraductal papillary mucinous tumour	1	1	0	0
Chronic pancreatitis	1	1	0	0

mesenteric group of nodes. These are considered among the posterior group of regional lymph nodes for pancreatic and ampullary/duodenal cancer. Our protocol, which mandates submission of the entire uncinate margin, ensures that these nodes are evaluated histologically, whereas an *en face* submission or protocols that submit less than the entire uncinate margin rely on gross identification of the nodes to ensure their submission. In our study, the number of nodes found in *en face* sections of the uncinate margin was negligible (0.1 nodes per case) compared with the 1.8 nodes per case found when the uncinate was perpendicularly sectioned and submitted *in toto*. In 3 of 20 cases studied by the new protocol, nodes found in the uncinate margin sections played a role in staging.

The overall lymph node retrieval rate was also increased in cases handled according to our new radial protocol compared with the *en face* protocol. On average, the increase was more than four lymph nodes per case. While it is plausible that at least part of this increase was due to nodes found in the uncinate margin that may otherwise have gone unsampled, it is likely that overall awareness of the importance of handling of these specimens was increased by the introduction of the protocol, which may have indirectly helped to increase lymph node retrieval. The new protocol was introduced in 2005, and involved education of pathologists, pathologist assistants, and residents who were involved in the signing out of these specimens. Prior to 2004, the uncinate margin was not evaluated consistently. Our experience demonstrates that attention to gross handling of specimens can result in improved pathologic detection and reporting of important prognostic information.

The Whipple procedure is one of the most radical surgeries performed for the primary management of a variety of tumors involving the head of pancreas, ampulla of Vater, common bile duct, or duodenum. We have recently witnessed an increasing influence of improved modern imaging techniques, such as CT and MRI, on the management approach to pancreatobiliary and duodenal tumors [7]. These techniques not only help to make a preoperative diagnosis with reasonable accuracy but also help to plan the type and extent of surgery. Concurrently, the safety of pancreatic resection has been consistently improving, making the procedure less morbid [8–10]. In many complicated cases of chronic pancreatitis presenting as a periampullary mass, the Whipple procedure is now considered justifiable [11]. For all these reasons, we and others [12] have witnessed the shift in practice with the Whipple resection becoming increasingly planned on the basis of clinical and imaging findings, with diminishing need for a confirmed preoperative tissue diagnosis. In a recent audit of the last 15 years of our practice at Sunnybrook Health Sciences Center, only 8.5% of all patients who received pancreatic surgery had a preoperative tissue or cytologic diagnosis (unpublished data). Consequently, the pathologist performing an intraoperative consultation on the margins of resection often is not even certain of the presence of malignancy in the specimen. Since the detection of metastatic tumor cells in regional lymph nodes constitutes a universally acceptable criterion for malignancy, which is particularly useful in cases with endocrine tumors [13–15], increasing the likelihood for picking up lymph node metastasis during the intraoperative consultation by this new protocol becomes a particularly useful tool.

In conclusion, our new protocol, which was originally introduced to improve the accuracy of the uncinate margin assessment, has concomitantly enhanced lymph node retrieval. The increased lymph node count in cases handled by this method is statistically significant. This observation is an added incentive for adopting the new uncinate margin protocol.

Acknowledgements and disclosures

There are no disclosures.

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